14 February 1975

MEMORANDUM FOR: [redacted] 25X1

Attached is a consolidated paper on the use of NRP air and satellite photography for civil applications, per your request. It is primarily a consolidation of the following:

a. The 22 May 1974 draft paper by [redacted] for use in Congressional staff discussions at that time; 25X1

b. A comment on the Federal Mapping Task Force report based on data from that document;

c. Examples of current on-going programs drawn from the 16 September 1974 joint agencies memorandum discussing their plans for use of coverage from the classified systems.

While there is some overlap (in discussion of examples) between this paper and John Hicks' on NPIC support to other government agencies, I recommend the two be used together, depending on focus of interest.

[redacted] 25X1

cc: A/DDS&T
A/DDI
D/NPIC

14 February 1975

Use of National Reconnaissance Program (NRP)
Air and Satellite Photography for Civil Applications

The following material describes the use of intelligence photographic satellites and aircraft to support the civil applications requirements of other federal agencies. It includes an account of what has been done over the past ten years or so and a description of the procedures used to ensure against CIA's inappropriate involvement in domestic activities.

Intelligence satellites are operated by the National Reconnaissance Office (NRO), which is an organization of the DoD, and are funded as a portion of the DoD budget. Their overall management and funding is therefore separate from the CIA. CIA's connection with satellite photography is through the NPIC, where the pictures are interpreted; through the Directorate of Science and Technology, which is developing a future system under the management of the NRO; through COMIREX, which is a committee of the USIB for determining the priorities of intelligence targets; and, of course, through intelligence analysis based on interpreted photography.

The development and use of U-2 aircraft and photographic satellites in the 1950's and 1960's for intelligence reconnaissance and military map making led rather quickly to a general recognition of the operational advantages and cost savings that could result from using these same vehicles for civilian mapping. Later, in the mid-1960's, those who had regular access to the air and satellite photography began to discover ways that these pictures could be used to good advantage in solving a number of non-intelligence problems and in applications of value to USGS, the Weather Service, the Forestry Service and others. The purpose of discussion which follows ~~of this paper is~~ to describe the history of these non-intelligence developments and ~~to~~ document the occasions when intelligence photo assets have been used for these problems; why and under whose authority they were done, and who benefited by the application.

ckground

From the beginning of satellite operations, the Corps of Engine has made routine use of satellite photography for producing military maps and charts of foreign areas and also of the United States. To support these military mapping requirements and to test or verify satellite performance, considerable photography is taken over the United States each year. (In 1974, for example, US coverage accounted for ~~seven~~ six per cent of our total film expenditure.) It soon became apparent that the United States imagery could be of equal benefit to the USGS for the production of maps and charts of the United States for civilian use. In 1965, in response to a Bureau of the Budget request, the Department of Defense completed a study of US civil agency mapping operations and the potential improvement that could result from the use of NRP assets. As a result of this study, the US Geological Survey budgeted for and received Congressional approval in 1967 to construct a facility for use of the classified photography by the civil agencies. Such a facility was built in Reston, Virginia, in 1967, and since 1968 has been operated by the USGS to convert classified satellite photography to unclassified maps and charts to meet domestic mapping requirements. Because of the substantial coverage of the United States each year for military requirements and satellite system performance evaluation, very little additional coverage is needed to satisfy the civilian mapping program. In 1974, the photography taken specifically for civilian purposes came to ~~only a fraction of~~ less than one per cent of the total.

Now raise to 3%

Some domestic photography is also required for direct intelligence support purposes in addition to that needed for satellite system performance evaluation. For example, special films and photographic sensors undergo extensive testing in the course of their development for foreign intelligence applications. This testing requires extensive photography of various types of terrain and installations. The photography, itself, is generally retained by the intelligence organization performing the tests and is not used by civil agencies. Domestic photography is also acquired to support photo interpreter training and to assist in analysis of foreign activities through knowledge of their US analogs. When appropriate, this photography is made available for civil uses at the Reston facility.

The early use of the reconnaissance photography for military and civilian map making stimulated considerable interest in other uses of the imagery for civil applications. By 1966, a large number and wide variety of potential civilian applications had been suggested by various people who had access to this highly classified photography. However, at that time few of these possibilities had been proven from a cost-value standpoint and in most cases were not even recognized by those in civil agencies who might put these applications to operational use because few of these people had the security clearances needed for access to the photography. As a result, the President's Science Advisor decided to sponsor a study to expose the product of these expensive and valuable photo-satellites to specialists from the civilian agencies so that they could evaluate the photography and determine whether it could be profitably used by the several civilian agencies, and whether this could be done without interfering with or impacting the cost of operating the satellites. To do this he arranged with the DCI and the Secretary of Defense to provide clearances to selected professionals in the civilian agencies and to give them access to already collected photography for evaluation.

This study, called the "ARGO Study," did validate a number of applications for which the classified photography would be useful to civilian agencies like Agriculture, Commerce and AID. It did not, however, determine the dollar value of such uses and did not, therefore, answer the question of how much any agency should be willing to pay to get such photography. The applications suggested included the following:

Crops and land use measurements;
population estimates and tax base estimates;
snow coverage measurements, flood prediction, and water management;
supplement to nationwide forest inventory programs;
water resource planning;
sea ice studies, monitoring and forecasting;
harbor and coastal area chart revisions;
regional studies involving landforms, general land use and drainage;
preliminary engineering surveys and route selection;
and urban analysis and transportation studies.

The ARGO report recommended that a standing committee be formed of representatives from the civilian organizations which could collate specific requests that these agencies might make for classified photography and pass requests to the operators of aircraft and

satellites. On the recommendation of the Science Advisor, the DCI concurred with the establishment of this committee and agreed to supply requested photography, provided the filling of the request did not interfere with intelligence and military operations. In 1968, therefore, the ARGO Steering Committee was established, chaired by the Office of Science and Technology under the President's Science Advisor, with membership from USGS, Commerce, Agriculture, NASA, Interior, State/AID, Corps of Engineers (Civil Works) and the Office of Emergency Planning. The Committee's function was to review any request for photography made by any one of the members and make a judgment about its validity and importance. Those requests considered to be sufficiently important were formally transmitted to a representative of the DCI, who determined whether the request could be filled without significant impact and cost to the reconnaissance program. If these conditions were satisfied, he made arrangements for the necessary coverage. A significant number of civilian requirements were satisfied at the ARGO Committee's request. From the standpoint of the DCI and the intelligence community, the great virtue of the ARGO Committee was the fact that it insulated the community from passing judgment on the validity of civilian agency requests for coverage and from any involvement with the use to which the pictures were put.

The ARGO Committee ceased to function when the Office of the President's Science Advisor was abolished in 1973. Since then, the intelligence community and interested civilian agencies have been working to find a suitable way of reinstituting the function that had been performed by the ARGO Committee. The current plan is to establish a new committee of representatives of the civilian agencies that constituted ARGO, but with a chairman from the US Geological Survey. The committee would function as the ARGO Committee did.

In the attachment to this paper, we have compiled a description of all the non-military, non-intelligence applications that have been served by the photography from U-2 aircraft and NRP satellites. A perusal of these indicates the range of uses to the civilian community. The U-2 pictures of the Sierra Nevada snow fields to support water conservation decisions, and the coverage of the Santa Barbara oil spill to assist in a major non-military crisis are particular cases in point. In most of these cases the request for coverage was coordinated by the ARGO Committee. It is the hope that by establishing a new committee of similar function we can provide a mechanism for continuing to provide this kind of service on important problems as they arise, and at the same time, ensure that only those requests validated as important by the potential user are approved.

In 1969, the USIB formally reviewed and endorsed a program for the collection and utilization of reconnaissance satellite photography in the United States in support of the National Topographic Map Series. The program provided for an annual USGS requirement of 300,000 nautical square miles of panoramic photography in the conterminous US. In 1971 this program was updated for the then current satellite system, and the USIB approved the extension of the requirement area to include all of the United States and its outlying areas (e.g., Puerto Rico). To the degree feasible, the panoramic coverage to support the USGS requirement was to be acquired as a by-product of the satellite system engineering performance evaluation operations. In 1972, a total requirement of 1.6 million nautical square miles of special Mapping-Camera-System (MCS) coverage in the US and 0.4 million nautical square miles in Antarctica was approved for collection to satisfy metric requirements.

In 1972-73, the Office of Management and Budget (OMB) conducted an 18-month interagency study of civilian mapping, charting, and geodesy (MC&G) requirements, operations, products, and methods. A classified summary of the investigation with conclusions and recommendations was published by OMB in July 1973 under the title, "Report of the Federal Mapping Task Force (FMTF) on Mapping, Charting, Geodesy and Surveying." Three of the recommendations made in this report were:

> "The once-over coverage of the United States with suitable cloud-free photographs by the reconnaissance satellite system be endorsed as a national domestic requirement, to be completed within one year."
>
> "Recoverage be provided to an extent of 750,000 square statute miles, unique, 90 percent cloud-free, per year. Such an allocation is to be considered separate from and without any impingement on the military MC&G requirement."
>
> Development of a common data base (photo repository) of materials derived from classified systems for use in civil applications.

The FMTF Report as a whole, and its various recommendations have been under review within affected federal agencies and departments, but have not been finally approved or fully implemented to date.

Several Departments have been conducting pilot studies in the Reston facility that are directly or indirectly associated with MC&G activities. Some of the agencies in these Departments have already indicated a commitment to utilize the classified system source materials in their programs based on the FMTF recommendations. This has been accomplished with a certain amount of program risk involved since only a limited amount of imagery has been available in direct support of their programs. There is under review now a joint request from civil agencies in the Department of Agriculture, Army (Civil Works), Commerce, and Interior for DCI and USIB approval and assurances concerning the long run availability of coverage of the US from the classified satellite systems to support the civil programs.

Examples of Current On-Going Programs

Department of Agriculture. The Forest Service has been conducting pilot studies in the USGS classified facility since 1972. As a result of these investigations, the Forest Service has identified several programs that have been proposed for implementation with the support of satellite imagery.

a. National Forest Inventory: The Forest Service has adopted a mapping system based on the USGS 1:24,000-scale quadrangles that cover the National Forests. Resource "overlays" will be developed that include timber classification, slope information, soil classification, mineral activities, communication information, administrative sites, etc.

b. Monitor Disturbances on Forest Lands: The Forest Service also is responsible for maintaining an inventory of forest resources (area, location, timber types, and volume) on a nationwide basis. The inventory cycle is 5-10 years and is determined by the rate of change in the area.

The Soil Conservation Service, Statistical Reporting Service, and the Agricultural Stabilization and Conservation Service also are conducting investigations in the use of satellite imagery to support their programs.

Department of the Army, Corps of Engineers (Civil Works). The Corps of Engineers (Civil Works) is responsible for the accomplishment of many domestic programs that can be supported by satellite imagery. Imagery has been used to develop geologic analyses for proposed water resource projects, to investigate sites to determine their potential for pumped-storage power facilities, and to do base-line environmental mapping for regional water resource studies. Imagery will also be used to locate and monitor coastal and river-bank erosion problems, monitor Federal lands to limit encroachments, and to assess flood hazards and damages.

Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). The National Ocean Survey (NOS), NOAA, has the assigned mission to produce and maintain navigational charts (aeronautical and nautical) for the US and surrounding coastal waters. The program requirements are to revise the aeronautical charts twice a year and the nautical charts as required by changes in terrain and cultural features. Timely acquisition of photography of the type provided by classified systems is essential to update these charts. NOAA also has used imagery to assess damage after coastal flooding, and to monitor ice movement in the Great Lakes and locate coastal fish populations.

Department of the Interior. The Geological Survey has been utilizing the materials from the satellite system in support of the National Mapping Program since 1969. The Survey has instituted other activities that include a Land Use and Data Analysis (LUDA) program, environmental studies, and the classification and inventory of natural resources.

In addition to these programs, the Bureau of Land Management and the Bureau of Indian Affairs also have pilot activities in the classified facility. These agencies are actively engaged in the administration and management of approximately 30 percent of the land area of the US. For these purposes, satellite imagery provides an excellent and economical management tool to classify and monitor the natural and man-created effects on the environment.

The DCI maintains approval authority for access to classified satellite imagery by personnel in the civil agencies on the basis of his statutory responsibility for the protection of intelligence sources and methods, but neither the DCI nor the intelligence community are involved in decisions concerning the civil user's needs or priorities. The DCI does have the responsibility to ensure that collection to satisfy civil needs does not interfere with the national intelligence mission.

Summary

In summary, our intelligence reconnaissance assets provide a vast amount of photography which is designed to support foreign intelligence and military mapping needs, and based on decisions made in the mid-1960's, a federal program was initiated to use these satellites as a primary source of data to support the domestic mapping program. In addition, over the past ten years a number of occasions have arisen where U-2 aircraft and satellite pictures have been used to help civilian agencies by providing selected pictures for particular requirements that arose. Although we recognize the sensitivity of using satellites to take pictures of the US areas for domestic requirements, we believe the government should allow the use of these valuable resources for bonafide and important civilian needs when they arise. We hope that the mechanism of a civilian agency committee to consolidate and validate such requests will keep the DCI sufficiently removed from the decision about what photography is needed and how it is used to satisfy concerns about his potential involvement in domestic affairs, and will leave that determination in the hands of the requesting civilian agency. It will, however, keep him in a position to prevent an unreasonable use of the satellites and to levy charges on the requestor should the time ever come when the add-on costs of this support become significant enough to warrant a reimbursement procedure.

Attachment

Civilian activities which have used or are currently using NRP photography.

Domestic Mapping: Based on the Department of Defense study in 1965, which was requested by the Bureau of the Budget, the United States Geological Survey budgeted for and received funds to establish a facility at Reston to apply NRP photo products to aid in the domestic mapping program. The program is successfully taking advantage of the wide area coverage of satellite photography. Formal requirements of the USGS for such photography were ~~first~~ approved by the USIB and DCI in 1969.

North Carolina Dam Survey: Based on the assignment by the Congress (HR 15951) to inspect US dams after the West Virginia dam failure, the Army Corps of Engineers (Civil Works) is currently using NRP satellite photography for this purpose. A pilot study of dammed water bodies in North Carolina is underway using the satellite photography to determine location and size with subsequent field check for accuracy.

Forest Management: The Forest Service of the Department of Agriculture is now using NRP satellite photography to assist it in the management of the national forest resources. The Forest Service uses the USGS Reston facility for this purpose.

Charting Study: The National Ocean Survey of the National Oceanic and Atmospheric Administration, Department of Commerce has undertaken an exploratory charting study as part of a broad Department of Commerce program to use NRP photography in charting US coastal waters, - US aeronautical charting, - supporting densification of US geodetic control, - help in estimating population trends, land use changes, and urban dynamics, - support to coastal zone management program in land use change and other features of the coastal zone, - support in hydrology as related to flood potential and water resources prediction, - and to support decision-making with regard to the National Environmental Satellite Service program.

Highway Route Survey - So. Indiana: In 1966 the Army Corps of Engineers used NRP satellite imagery as the primary input to determine two alternate feasible routes for interstate highway No. 64 through southern Indiana.

Alaskan Pipeline Route Survey: In April 1970 the US Geological Survey used NRP satellite imagery in conjunction with a limited amount of existing maps and geological data, many of which dated back to the gold rush days, to make a preliminary route survey for an Alaskan pipeline from Fairbanks to the north slope oil field.

SECRET

Drought Condition in Chile: In 1968 NRP satellite imagery was requested by the ARGO Steering Committee to support the Agency for International Development in its study of the severity of the drought in Chile. The analysis, performed by the National Photographic Interpretation Center (NPIC) compared recent and old NRP satellite imagery to determine a base point and the current deviation of the water levels in the remote water storage areas in the high Andes, where neither adequate stream gauges nor lake and reservoir volume data were available. When drought conditions persisted the following year, the effort was repeated.

Lake Michigan-Wabash River Barge Canal: In 1969 the Army Corps of Engineers used NRP imagery to ascertain the feasibility of the proposed Lake Michigan-Wabash River Barge Canal in northeastern Indiana.

Santa Barbara Oil Spill: At the request of the President's Science Advisor, U-2 color photography of the February 1969 oil spill off Santa Barbara, California, was taken and was put in the hands of the concerned government agencies within 72 hours. The Department of Interior thus obtained useful information on damage assessment, drift pattern of the oil slick, effects of offshore currents, and effectiveness of damage abatement techniques such as log booms.

Sierra Nevada Snow Fields: At the request of the ARGO Steering Committee, U-2's have made regular coverages of Sierra snow fields in conjunction with routine training flights. Imagery acquired has provided the State of California and Department of Commerce with information on the Sierra Nevada major watersheds to help in forecasting the extent of runoff. The 1969 information on the Kern River basin conserved millions of gallons of water by showing there was no further danger of flood and thus it was not necessary to lower the reservoir levels.

Mississippi and Missouri River Basins: At the request of the ARGO Steering Committee, a program similar to that of Sierra Nevada was attempted in 1969 in the upper Mississippi and Missouri River basins. It was not successful as major flooding had already started and the water management problems were different. However, side-looking radar on conventional aircraft was also used and was effective in penetrating cloud cover and delineating the water-saturated areas. The Mississippi River was photographed from Illinois to the Gulf on one photographic pass at the height of the 1973 floods.

Northwest Passage Support: In May 1969 the US Coast Guard, through the ARGO Steering Committee, requested NRP satellite photographic coverage to support the projected navigation of the northwest passage by the reinforced supertanker SS Manhattan to the Alaskan oil fields.

e imagery was needed to revise coastal topography and shoreline for nautical charts and to analyze the Polar ice drift, fracture patterns, and the extent of ice pressure ridges that would influence navigation.

Earthquake Damage Assessment: Both NRP aircraft and satellites contributed to earthquake damage assessments both at home and abroad. In 1966, the National Photographic Interpretation Center provided a damage assessment of the Soviet city of Tashkent. In 1971, the USGS used high altitude aircraft of the Los Angeles earthquake. In 1973, the National Photographic Interpretation Center made available to the Agency for International Development a damage assessment of the earthquake in Managua, Nicaragua.

Post-Disaster Damage Assessment and Pre-Disaster Planning: NRP air and satellite photography has been used to help assess tornado and hurricane damage in the US. Examples are the tornado area in Lubbock, Texas, and the hurricanes Celia and Camille. The desire by the Office of Emergency Planning to have a data base for use to assess disasters resulted in their requirement for NRP satellite coverage of 115 US cities. On the lowest collection priority these were covered by October 1968 against the requirement levied earlier in the year. At the request of the ARGO Steering Committee, U-2 coverage was provided for the data base covering the Gulf Coast and was also used for map revisions by the US Geological Survey.

Whale Calving Areas: In 1972, NRP satellite photography was used for a count of whales for the Office of National Marine Fisheries. Two areas covering a total of 50 square miles off the west coast of the Lower California Peninsula, Mexico, were searched and approximately 19 whales in one area and 8-10 in the other were found.

North American Grain Fields: A project has been undertaken by the Central Intelligence Agency in cooperation with interested agencies to improve crop prediction techniques using remote sensing, including NRP satellite imagery. While the target has been the Soviet grain crop, ground truth to aid in that analysis has been obtained in imagery of the North American grain fields.

Swine Fever-Cuba: Concern by the Department of Agriculture of possible introduction of swine fever to the US mainland via hog products accompanying Cuban refugees, caused the National Photographic Interpretation Center to analyze imagery of Cuba to determine signs of hog eradication and destruction of carcasses.

West African Drought: The vastness and importance of the West African drought has caused the National Photographic Interpretation Center to look at NRP satellite imagery to determine the extent and affected areas. Currently, older NRP imagery is being reviewed for baseline purposes.

Pakistan: In 1971, at the request of the ARGO Steering Committee, support was given to the Agency for International Development using NRP imagery in determining effects of the war.

ERTS and Skylab Underflight Program: In 1972 and 1973 in support of ERTS and Skylab respectively, NRP U-2's were used to support the National Aeronautics and Space Administration with ground truth data to aid in the testing of camera systems. Areas of southwestern US were covered.

Mid-West Coal Leasing Area: In 1974 the Bureau of Land Management identified high priority requirements for satellite coverage of a coal leasing area in Montana, Wyoming, North and South Dakota. The energy crisis has stimulated new interest and activity in the extraction of coal from this area, approximately 80 percent of which lacks large-scale map coverage. The photography is being used to satisfy the mapping requirement and also to provide basic data for transportation route planning, land use classification, water resource inventories, and geological studies.

Specially collected domestic photography was used during October and November 1972 in a search attempt when Congressman Hale Boggs' plane disappeared during a flight over Alaska. At that time special high altitude photo missions were flown and NPIC photo interpreters and other support personnel searched the resulting film for any evidence of the missing plane. The results, unfortunately, proved negative.